Space Weather Forecast

Issued on Thursday, 12 October 2023 at 13:02 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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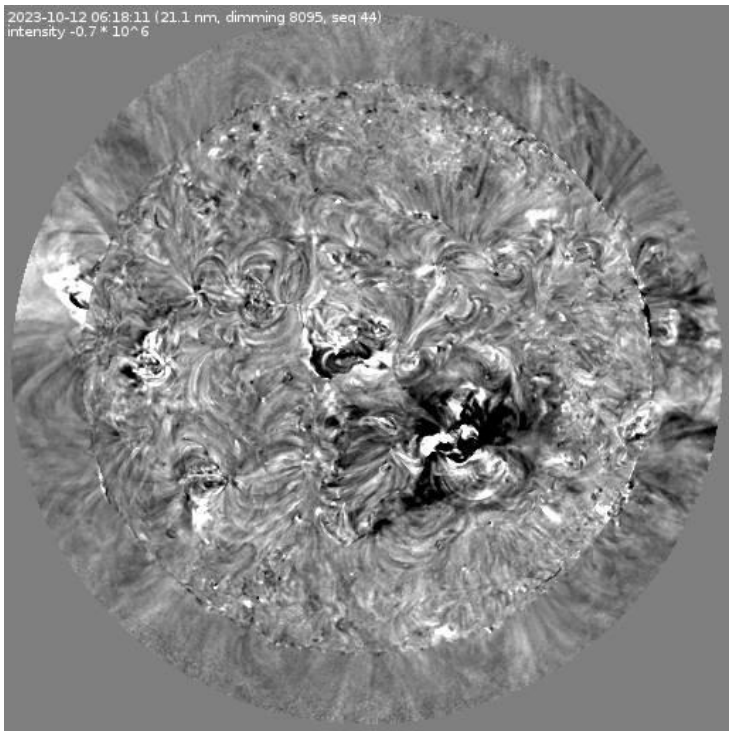
Space Weather Forecast Headline: Ongoing Chance of Moderate-class X-ray flares. Now reduced slight chance of G1/Minor geomagnetic storm to end current UTC week. Possible new Coronal Mass Ejection (CME) awaiting imagery.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has risen to Moderate in the past 24 hours, with a complex sunspot region on the northwestern solar horizon producing a peak Moderate-class flare at 12/0458UTC. This was preceded by a long-period high Common-class flare from a second complex region in the south-centre of the facing side. The flare from this later event appears to have an associated CME, although there was no imagery available to confirm this as of the issue of this document. This is a main point of monitoring in the coming hours.

Figure 1: Time-integrated extreme UV 'dimming' in wake of the common class flare from a sunspot near the centre of the facing side. This has not yet revealed any obvious CME in imagery. Imagery processing courtesy of SIDC ROB.



There were up to nine sunspot regions on the facing side of the Sun in the period. A global imagery outage for some solar measures is hampering recent sunspot analyses, however available lower resolution data appears to show that the main changes include some proliferation of trailing spots in a smaller sunspot group in the southeast, while a newly-

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designated sunspot group in the centre has shown a spreading trend. The nominally most potent sunspot groups on the Sun remain those that have produced the largest recent flares, mentioned above.

There are numerous 'filaments' (arcs of plasma) on the Sun at present, however observed Coronal Mass Ejection (CME) activity has been largely limb-ward. The main observed features on imagery have been a large and wide CME from narrowly behind the northeastern horizon, (perhaps from the vicinity of a returning sunspot); as well as a narrower and apparently slower emission from a small frontside group in the southwest at 11/2304UTC. Both of these CMEs have been analysed and although results are awaited, their distance from the Sun-Earth line means that effects at Earth are unlikely.

Solar Wind / Geomagnetic Activity: Solar winds continue to show a (probable) slow regime. The solar wind speed rose a little within background levels with the number of particles largely unperturbed (at background). The associated magnetic field was mainly smooth a small-scale, with an unremarkable north-south component.

The net effect of the above solar wind measures was provisionally quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed, with no obvious minor response to any of the observed flare events of the period.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a continuing chance of Moderate-class flares through the four-day period.

Solar Wind / Geomagnetic Activity: The CME associated with a mid-ranking Common-class flare from 08 Oct is now overdue but may yet arrive at Earth in the coming 12 hours. There is now also a possible new CME from the long-period flare event on 12 October, although analysis is pending imagery.

The only fast wind expected is now also overdue. Given the late onset(s) of the CME and fast wind, the relative risk of Minro geomagnetic storm G1 is now lowered and curtailed to within the current UTC working week, else falling quiet into the UTC weekend.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	10	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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